FOLSOM CORDOVA UNIFIED SCHOOL DISTRICT

Biotechnology: Exploring the Blueprint of Life

Board Approval Date: January 18, 2024	**Course Length: 1 Semester**
Grading: A-F	**Credits: N/A**
Proposed Grade Level(s): 7, 8	**Subject Area: Elective** **Elective Area (if applicable):** **Science**
Prerequisite(s): **6th Grade Science**	**Corequisite(s):**
CTE Sector/Pathway:	
Intent to Pursue 'A-G' College Prep Status: No	
A-G Course Identifier:	
Graduation Requirement: No	
Course Intent: **Program (if applicable):**	

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COURSE DESCRIPTION:

Biotechnology is a dynamic and rapidly evolving field that harnesses biological processes and organisms to develop innovative solutions for a wide range of applications, from healthcare and agriculture to environmental conservation and industrial processes. This introductory course provides a comprehensive overview of the fundamental principles and techniques that underpin the field of biotechnology. Students will explore the exciting intersection of biology, chemistry, genetics, and engineering that drives advances in biotechnology.

DETAILED UNITS OF INSTRUCTION:

Unit Number/Title	Unit Essential Questions	Examples of Formative Assessments	Examples of Summative Assessment
1. Microscopic Organisms	How can we see microscopic living things? What are the different kinds of living things? What are the parts of a cell?	*Microscope investigation *Colony plating *Cell organelle diagrams	*Create a book on the components of a cell
2. Structure and function of DNA	What are the parts of a DNA molecule? What are the processes that DNA is involved in?	*DNA molecule model *Protein synthesis simulation *DNA extraction	*DNA model
3. Using DNA	What careers use genetic manipulation? What processes are used to manipulate DNA?	*Career research project *DNA manipulation lab	*Career presentation.

ESSENTIAL STANDARDS:

Middle School NGSS Science Standards
Middle School NGSS Engineering Design Standards
MS-LS1-1. Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.
MS-LS1-2. Develop and use a model to describe the function of a cell as a whole and ways the parts of cells contribute to the function.
MS-LS3-1. Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.
MS-LS3-2. Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.
MS-LS4-5. Gather and synthesize information about technologies that have changed the way humans influence the inheritance of desired traits in organisms.
MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a

successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

RELEVANT STANDARDS AND FRAMEWORKS, CONTENT/PROGRAM SPECIFIC STANDARDS:

Link to Common Core Standards (if applicable):
Educational standards describe what students should know and be able to do in each subject in each grade. In California, the State Board of Education decides on the standards for all students, from kindergarten through high school.
https://www.cde.ca.gov/be/st/ss/documents/finalelaccssstandards.pdf
https://www.cde.ca.gov/be/st/ss/documents/ccssmathstandardaug2013.pdf

Link to Framework (if applicable):
Curriculum frameworks provide guidance for implementing the content standards adopted by the State Board of Education (SBE). Frameworks are developed by the Instructional Quality Commission, formerly known as the Curriculum Development and Supplemental Materials Commission, which also reviews and recommends textbooks and other instructional materials to be adopted by the SBE.

Link to Subject Area Content Standards (if applicable):
Content standards were designed to encourage the highest achievement of every student, by defining the knowledge, concepts, and skills that students should acquire at each grade level.
Health Science Medical Technology Standards A1.1 Use data to explain how biotechnology fields such as pharmaceuticals, agriculture, diagnostics, industrial products, instrumentation, and research and development are impacting human life. A1.2 Describe the use of model organisms in biotechnology research and manufacturing. A1.3 Recognize the role of innovation in creation of emerging biotechnology careers, including those in nanotechnology, biofuels, and forensics. A1.6 Explore and outline the various science and non-science fields and careers associated with biotechnology. A3.1 Define and describe the structure and function of DNA ribonucleic acid (RNA) and proteins, explain the consequences of DNA mutations on proteins. A4.0 Recognize basic concepts in cell biology and become familiar with the laboratory tools used for their analysis. A4.5 Discuss the structure and function of the macromolecules that compose cells, including carbohydrates, lipids, DNA, RNA, and protein molecules. A4.6 Distinguish between prokaryotic cells, eukaryotic cells, and viruses

Link to Program Content Area Standards (if applicable):
Program Content Area Standards applies to programs such as International Baccalaureate, Advanced Placement, Career and Technical Education, etc.

TEXTBOOKS AND RESOURCE MATERIALS:

Textbooks

Board Approved	Pilot Completion Date (If applicable)	Textbook Title	Author(s)	Publisher	Edition	Date
		N/A				

Other Resource Materials

Instructor created instructional materials.

Supplemental Materials

Board approved supplemental materials (Including but not limited to: Film Clips, Digital Resources, Supplemental texts, DVDs, Programs (Pebble Creek, DBQ, etc.):
N/A